Applicant: Haakonsson, Jane Organisation: Cayman Islands Department of Environment

Funding Sought: £33,627.00

DPLR1\1076

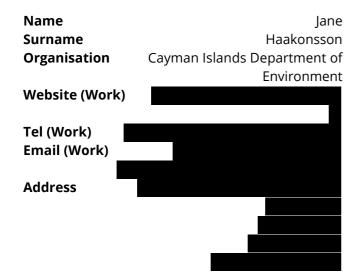
Remote monitoring of Sister Islands Rock Iguanas on Cayman Brac

This pilot project will use custom-made Wireless Sensor Nodes (WSNs) to remotely track Critically Endangered Sister Islands Rock Iguanas (SIRI: Cyclura nubila caymanensis) on Cayman Brac. SIRI are endemic to two of the three Cayman Islands, Little Cayman and Cayman Brac. Collectively known as the Sister Islands, these are much smaller than Grand Cayman (196 square km) and located about 130 km to the northeast. The SIRI population on Little Cayman is significantly larger than the population on Cayman Brac and has been the focus of intensive study, monitoring efforts, and conservation actions. At 36 square km and inhabited by around 2,000 people, Cayman Brac is larger and more populated than Little Cayman (26 square km and around 200 people). Nonetheless, SIRI has been insufficiently studied on the Brac due to the inaccessible terrain and small population (estimated at less than 500 adults). Further, due to increasing road mortality and development in known coastal nesting areas, the population is declining. Major conservation threats for the species include habitat loss, predation from invasive mammals, and mortality from increasing traffic. More recently, hybridization with the alien invasive Green Iguana (Iguana iguana) has been documented to pose a new threat for SIRI. This project aims to meet many of the objectives prioritized in the "2021-2024 Species Action Plan for the Sister Islands Rock Iguana" identified by the DoE. Critical information on habitat use, population turnover, and the locations of interior nesting sites is required to support the proposal of Protected Areas and guarantee the long-term survival of SIRI on Cayman Brac.

The custom made WSNs have been fundamental in defining migration routes, home range size, and habitat use in Critically Endangered Galápagos Pink Land Iguanas (Conolophus marthae). Our devices can be powered through miniaturized solar panels, batteries, or a combination of the two. They can collect accurate (± 5m) position data, temperature, humidity, UV light and even physiological parameters at user-specified time intervals. They can also be equipped with additional sensors to satisfy user specified needs. To transfer data, WSNs can rely on different communication protocols that exploit a satellite connection, local area internet networks or cellular network technology. The georeferenced information gathered via our WSNs can be used within a conservation framework to identify key areas of habitat for the species. Combining georeferenced data with habitat maps can help identify critical areas within the iguanas' range (e.g., nesting and/or feeding grounds, and migration routes) that should be prioritized for conservation planning. Once identified, these areas will be entered in the GIS database developed and maintained by the DoE and ultimately proposed as new Protected Areas through the process stipulated in the National Conservation Act (NCA).

The end goal of this pilot study is to validate the use of WSNs for remote monitoring of SIRI on a minimum of 10 adult iguanas. WSNs will be attached to the tail-base of iguanas using epoxy glue and six simple interrupted sutures. The collection of georeferenced data from WSNs will begin immediately after attachment and will provide a live feed of data for the movements of tagged individuals. Based on the overall accessibility and on the network coverage of the area we will adjust the technology of the WSNs to work with a satellite connection or using the cellular network coverage. We expect our WSNs to remain attached to iguanas for a minimum of three months. All the handling and sampling techniques are in accordance with approved SDZWA Institutional Animal Care and Use Committee, and UTV ethics and animal handling protocols. All procedures will be performed under the supervision of a licensed veterinarian from NCSU.

CONTACT DETAILS



DPLR1\1076

Remote monitoring of Sister Islands Rock Iguanas on Cayman Brac

Section 1 - Project Title & Contact Details

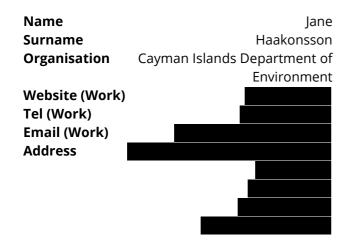
Q1. Project Title

Remote monitoring of Sister Islands Rock Iguanas on Cayman Brac

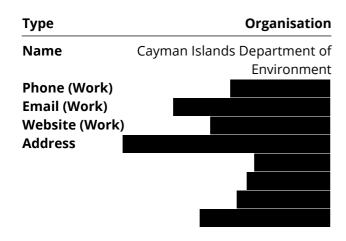
Q2. Please select whether you are applying as an organisation or as an individual (Guidance section 3 and Guidance Glossary)

Organisation

CONTACT DETAILS



GMS ORGANISATION



Section 2 - Overseas Territory(ies)

Q3. Overseas Territory (Guidance section 1.3):

Which UK Overseas Territory(ies) will your project be working in? Please note that in case of a non-permanent resident population you need to demonstrate a clear, meaningful, long-term link to the territory.

☑ Cayman Islands

* if you have indicated a territory group with an asterisk, please give detail on which territories you are working on here:

No Response

In addition to the UKOT(s) you have indicated, will your project directly benefit any other UK OT(s) or country(ies)?

Yes

Please list these below and describe how they will benefit:

The innovative monitoring technology planned for Sister Islands Rock Iguanas, SIRI, (Cyclura nubila caymanensis) in the Cayman Islands has potential to be applied to endemic and endangered iguana species in other Caribbean UKOTs. These include Anegada Iguanas (Cyclura pinguis) in the British Virgin Islands, Turks and Caicos Iguanas (C. carinata) in the Turks and Caicos Islands, Lesser Antillean Iguanas (Iguana delicatissima) in Anguilla, and Montserrat Black Iguanas (I. iguana melanoderma) in Montserrat. All these taxa are Endangered or Critically Endangered, affected by similar threats as SIRI, and could benefit from the application of this technology.

Section 3 - Project Partners

Q4. Project partners (Guidance section 3.2)

In this section, please give details of all the partners involved (including the Lead Partner) and provide a summary of their roles.

Project Leader name (Guidance section 3.1):	Jane Haakonsson
Lead Partner name (if applying as an organisation; Guidance section 3.1):	Cayman Islands Department of Environment
Lead Partner Website (if applicable):	www.doe.ky
Is the Lead Partner based in a UKOT where the project is working (Guidance section 3.1)?	⊙ Yes

List other partners involved and where are they based (Guidance section 3.2):

Giuliano Colosimo, PhD; Gabriele Gentile, PhD; Pierpaolo Loreti, PhD; Lorenzo Bracciale, PhD - University of Rome Tor Vergata (UTV), Rome, Italy

Glenn Gerber, PhD - San Diego Zoo Wildlife Alliance (SDZWA), San Diego, California, USA

Greg Lewbart, DVM - North Carolina State University (NCSU), Raleigh, North Carolina, USA

Jane Haakonsson, Research Officer for the Cayman Islands Department of Environment (DoE), represents the leading organisation in this project. She will coordinate the work, manage the budget, oversee the timeline, ensure achievement of each milestone, and guarantee completion of the project.

Summary of roles and responsibilities of each partner in the project:

UTV personnel are composed of two biologists (Dr. Giuliano Colosimo, Dr. Gabriele Gentile) and two engineers (Dr. Pierpaolo Loreti, Dr. Lorenzo Bracciale). The engineers will oversee the assembly, programming, and the protocols for data harvesting of the custom developed Wireless Sensor Nodes (WSNs) that will be used to track iguanas remotely throughout the project. The biologists will conduct fieldwork necessary for the project and will be responsible for data analysis, interpretation of results, and creation of deliverables.

Dr. Glenn Gerber, Caribbean Program Head for SDZWA, will oversee and coordinate the fieldwork expedition necessary for the implementation of the tracking devices on Cayman Brac. He will also assist with data analysis, interpretation of results, and creation of deliverables, together with UTV personnel.

Dr. Greg Lewbart, a board-certified veterinarian at NCSU, will conduct the health monitoring of individual iguanas involved in the study and will oversee attachment of tracking devices to the tail base of iguanas.

I confirm that all listed partners are aware of this application and have indicated support:

Checked

Attach a Cover Letter for your application (Guidance section 4.2).

- & R1 DPlus Local Cover letter FINAL
- ① 15:48:46
- pdf 258.22 KB

Section 4 - Project Summary & Description

Q5. Project Summary (Guidance section 3.8)

Please provide a brief summary of your project. This may be used in communication activities and/or published online, if your application is successful.

Custom-made Wireless Sensor Nodes attached to individual iguanas will enable remote tracking of Sister Islands Rock Iguanas (SIRI) on Cayman Brac in the Cayman Islands. Tracking devices will provide data on movements, habitat use, and ecology of SIRI on Cayman Brac to close long-standing knowledge gaps in the biology of this Critically Endangered species. Data collected will help identify areas and habitats most important for the survival, reproduction, and foraging of SIRI so that effective conservation measures can be implemented.

Q6. Description (Guidance section 2.1)

Please provide a description of your project, including:

- the overall objective
- the current situation and the problem the project is trying to address
- what success will look like and how you will measure it

Please be as specific as possible when describing the project, using quantified data and evidence where available. You may wish to consider: what are the specific threats to the environment that the project will attempt to address, and what should we know about these threats? What does your successful project look like? And how will you demonstrate whether and how your project has been successful?

This pilot project will use custom-made Wireless Sensor Nodes (WSNs) to remotely track Critically Endangered Sister Islands Rock Iguanas (SIRI: Cyclura nubila caymanensis) on Cayman Brac. SIRI are endemic to two of the three Cayman Islands, Little Cayman and Cayman Brac. Collectively known as the Sister Islands, these are much smaller than Grand Cayman (196 square km) and located about 130 km to the northeast. The SIRI population on Little Cayman is significantly larger than the population on Cayman Brac and has been the focus of intensive study, monitoring efforts, and conservation actions. At 36 square km and inhabited by around 2,000 people, Cayman Brac is larger and more populated than Little Cayman (26 square km and around 200 people). Nonetheless, SIRI has been insufficiently studied on the Brac due to the inaccessible terrain and small population (estimated at less than 500 adults). Further, due to increasing road mortality and development in known coastal nesting areas, the population is declining. Major conservation threats for the species include habitat loss, predation from invasive mammals, and mortality from increasing traffic. More recently, hybridization with the alien invasive Green Iguana (Iguana iguana) has been documented to pose a new threat for SIRI. This project aims to meet many of the objectives prioritized in the "2021-2024 Species Action Plan for the Sister Islands Rock Iguana" identified by the DoE. Critical information on habitat use, population turnover, and the locations of interior nesting sites is required to support the proposal of Protected Areas and guarantee the long-term survival of SIRI on Cayman Brac.

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(Optional) Please upload any additional and supporting materials or files (such as maps of project sites, etc) below. Maximum of 5 pages:

No Response

Section 5 - Project Outcome(s)

Q7. Project Outcome(s) (Guidance section 1.2)

Successful Darwin Plus Local projects must demonstrate measurable outcomes in <u>at least one of the themes</u> of Darwin Plus, either by the end of the project or soon after through a credible plan.

Please tick which theme(s) of Darwin Plus your project underpins:

Checked	Biodiversity: improving and conserving biodiversity, and slowing or reversing biodiversity loss and degradation;
Unchecked	Climate change: responding to, mitigating and adapting to climate change and its effects on the natural environment and local communities;
Checked	Environmental quality: improving the condition and protection of the natural environment
Checked	Capability and capacity building: enhancing the capacity within OTs, including through community engagement and awareness, to support the environment in the short- and long-term.

Please justify your selection.

SIRI have been extensively studied on Little Cayman, but conservation efforts lag on Cayman Brac due to inaccessible habitat, low iguana population density, and the larger size of the island. Classic methodologies

for population monitoring are impractical on Cayman Brac and identifying inland nesting sites and other critical habitat for protection is a timely issue given renewed interest in developing the island. The local community will be engaged through project transparency and awareness raised on the importance of preserving this endemic species. Training of DoE personnel will allow capacity building and facilitate regional networking for the study of iguanas.

Section 6 - Project Timeline

Q8. Project timeline (Guidance section 2.2)

Please provide anticipated dates for the start and end of your planned project here. Please use the Darwin Plus Local Project Implementation Timetable Template (which can be downloaded below) to provide a list of the individual activities you have planned for this project, a brief description of what each activity entails, and the months in which the activities will be carried out. If the project involves only one activity (e.g. a purchase), please still provide project start and end dates (noting estimated times for procurement). Please note that your project will need to be completed by 31 March 2024.

Start date:	End date:	Duration (e.g. 3 months):
01 April 2023	31 March 2024	12 months

Please upload the completed Darwin Plus Local Project Implementation Timetable template with your proposed project activities below.

- & R1 DPlus Local Timetable FINAL
- © 17:06:03
- docx 35.64 KB

Section 7 - Costs

Q9. Costs (Guidance section 2.2 and please read the Finance Guidance)

Please provide a breakdown of costs to be funded through Darwin Plus Local (in GBP).

Are you seeking any matched funding for this project? (Please note that this is optional and there is no requirement to seek matched funding for Darwin Plus Local projects).

Yes

How much matched funding are you seeking and where from?

DoE accommodation: approx. //night/person per 5 persons/21 days = DoE vehicle: approx. //day per 21 days =

DoE staff time: DoE personnel will commit 10% of their working time UTV staff time: UTV personnel will commit 15% of their working time

SDZWA staff time: SDZWA personnel will commit 10% of their working time NCSU staff time: NCSU personnel will commit 10% of their working time

Budget line	Explanation	Cost in GBP
Staff costs:	matching	
Overhead costs:	The overhead is estimated at of total cost. The total net cost of the project is estimated at	
Travel & subsistence costs:	Two return tickets (UTV personnel) from Italy to Cayman Brac are estimated at approximately person. One return ticket from San Diego (SDZWA personnel) is estimated at about person. One return ticket from North Carolina (NCSU personnel) is estimated at approximately person. One return ticket from Grand Cayman (DoE personnel) is estimated at approximately person. We anticipate 3 weeks of field work with a subsistence cost at approximately person/day. For a 5 people team subsistence costs are estimated at	
Operating costs:		
Capital equipment:	THERE IS NO TEXT BOX IN THE ON-LINE PORTAL FOR "OTHER COSTS" OTHER COSTS: This represents the anticipated expenses associated with the production of WSNs. The market cost of the electrical and technological componentry is constantly oscillating, and it is hard to produce a verifiable quote. Our custom devices are anticipated to cost about /unit. This price includes the retrieval and shipping of all components, assembly of the WSNs, firmware and software development, testing and troubleshooting of WSNs. We anticipate the production of 10 prototypes and at least 10 units to be employed in the field.	
Consultancy costs:	None	
Total:		

This section provides more information on the budget to help evaluators understand how you will use the funds you are requesting. You do not need to list all costs, but please list and detail costs of more than £1,000 per item below, under the appropriate budget line.

Details of staff costs over £1,000 (if relevant)

No Response

Details of overhead	costs over £1,000 (if rele	vant):	
	ated at of total cost.		oroject is estimated at
Details of travel and	subsistence costs over	£1,000 (if relevant):	
/person. One re /person. One re /person. One re /person. We anti		o (SDZWA personnel) is e rolina (NCSU personnel) i lyman (DoE personnel) is rk with a subsistence cos	stimated at about s estimated at approximately estimated at approximately t at approximately
Details of operating	costs over £1,000 (if rele	vant):	
by a third-party comp		ense of approximately	/month assuming the use a total of
Details of capital eq	uipment costs over £1,00	00 (if relevant):	
box to enter the "OTH	IER COSTS" in GBP is not plant to use the CAPITAL EQ	present. Only the "Detail o	ne web application portal the of other costs if over enter an amount that should
Details of consultan	cy costs over £1,000 (if re	elevant):	
No Response			
Details of other cost	s over £1,000 (if relevant	t)	
the anticipated expen and technological con Our custom devices a shipping of all compo	ses associated with the proponentry is constantly os re anticipated to cost abounents, assembly of the WS SNs. We anticipate the pro	roduction of WSNs. The macillating, and it is hard to ut £ / / / / / / / / / / / / / / / / / /	TS AMOUNT!! This represents narket cost of the electrical produce a verifiable quote. Includes the retrieval and re development, testing and at least 10 units to be
	t was prepared in anoth urce, and the date it was	•	ted to GBP, please provide the
Other currency:	Exchange rate:	Source of this exchange rate:	Date exchange rate accessed:
No Response	No Response	No Response	No Response
	s been created to build c	apacity and contribute	to local economies in-territory

If less than 80% of the total project spend is to be spent within the OT(s), please explain why.

We currently anticipate spending about of the requested budget in Cayman Brac, during the field work planned and in overhead fees. The most expensive aspect of this project is associated with the production of the custom-made tracking devices necessary to accomplish the project. About of the budget will be spent on on-line transactions to purchase the necessary components and shipping all the material to the University of Tor Vergata (Rome, Italy) where the personnel responsible for the manufacturing of WSN devices work. A small percentage of this budget, approximately is dedicated to purchasing the service that will allow the data transferring protocol to function, whether satellite or cellular network. The remaining of the budget is expected to be used for the mobilization of the personnel required to perform the field work portion of this project.

Section 8 - Local and National Priorities

Q10. Local and national priorities

Please explain how this project aligns with local and national priorities? You may wish to consider the project in the context of national environmental laws, objectives, strategies, territory specific agreements, action plans or policies.

This project aligns with the objectives of DoE's Action Plan for the Sister Islands Rock Iguana and further seeks to close multiple knowledge gaps to accurately inform the pending Species Conservation Plan as directed under local environmental legislation: the National Conservation Act (NCA), part 4 section 17(1). As the populations of SIRI on Little Cayman and Cayman Brac are distinct, each is considered a separate conservation unit. With less than 6% of land protected on Cayman Brac, the NCA seeks to protect additional lands through part 3 section 7 and as prioritised through section 8(1)a: "to conserve, maintain and restore habitats and their associated ecological systems critical to the survival and recovery of species which are endangered, threatened, endemic or migratory species or of special concern for any other reason".

Will the project take place on Government owned land or water?

Yes

Please attach evidence that you have Government support i.e. Letter of Support.

- & R1 DPlus Local DOE Support Letter
- © 16:40:08
- pdf 676.02 KB

Section 9 - Project Risks

Q11. Project Risks

Please demonstrate your consideration of any risks involved in this project and how you intend to manage them. Depending on your project, you may wish to consider:

- Biosecurity risks particularly for projects involving external equipment.
- Safeguarding risks particularly for projects involving vulnerable groups such as children, older people or people with disabilities.

Risk	Mitigation
The most delicate aspect of this project is attachment of the WSNs to the tail base of the iguanas.	Extensive experience working on a different species of land iguana from Galápagos has shown that after the WSN attachment procedure individuals are fine and quickly return to their normal behaviour. The use of small self-healing surgical stiches has proven extremely beneficial to ensure that the device remains in place and the glue can solidify properly. The attachment procedure will be carried out by a certified veterinarian and will be immediately interrupted upon evidence of animal distress.
Difficulty in retrieving some of the WSN components on the market and delay in the WSN assembly.	The custom made WSNs are built in a modular way. Although they are engineered to work with certain specific components, they have also been designed to be flexible, and can be reprogrammed to work with alternative components. For example, if the GPS sensor currently used is unavailable on the market by the time we need to purchase all components, we can, with little software and hardware adjustments, purchase a different GPS with similar characteristics. This adaptive design will minimize any potential delay due to componentry shortage.
No Response	No Response

Do you require more fields?

O No

Section 10 - Terms & Conditions

Q12. Terms and conditions (Guidance section 3.10)

By applying for Darwin Plus Local you are adhering in full to the grant Terms and Conditions in full (available at: https://dplus.darwininitiative.org.uk/apply and as referenced in the Guidance at section 3.10). For information, the Terms and Conditions include requirements for all applicants to (amongst other requirements as per the full Terms and Conditions):

- Uphold a zero tolerance for inaction approach to tackling sexual exploitation, abuse, and harassment.
- Where appropriate, make all reasonable and adequate efforts to address gender inequality and other power imbalances.
- Notify all cases of fraud and theft (whether proven or suspected) relating to the project to the Grant Administrator as soon as they identified.

Please indicate you have read, and understood, and will adhere to the Terms and Conditions.

Checked

<u>If your application is successful:</u> If your project application is successful, the Fund Administrator (NIRAS) will ask you to provide some financial evidence for due diligence checks before you receive your project grant. (Please see section 3.3 of the Darwin Plus Local Finance Guidance). Please be ready to provide this evidence promptly.

Financial evidence for organisations: Year-end financial statements, the latest management accounts or audited accounts (if you have these).

Financial evidence for individuals: Proof of identity such as a passport, ID card or driving licence and solvency (such as bank statements) and a police check.

Section 11 - Certification

Certification

I certify that, to the best of my knowledge and belief, the statements made in this application are true and the information provided is correct.

Checked

I have the authority to submit an application on behalf of my organisation.

Checked

Name:	Jane Haakonsson
Position in the organisation: (if applicable)	Research Officer II, Terrestrial Resources Unit, Cayman Islands Department of Environment, Grand Cayman
Signature (please upload e-signature)	 ♣ Jane Signature ★ 14/02/2023 ◆ 16:49:33 ♠ pdf 7.1 KB
Date:	14 February 2023

Section 12 - Submission Checklist

Checklist for submission

Check

I have read the Guidance documents, including the "Darwin Plus Local Guidance" and the "Darwin Plus Local Finance Guidance".				
If my proposed project takes place on public lands or water, I have uploaded a Letter of Support from Government.	Checked			
I have uploaded a cover letter that details the information requested in the guidance (Guidance section 4.2 has information on what this cover letter should include).	Checked			
I have read, and can meet, the current Terms and Conditions for this fund.	Checked			
I have provided actual start and end dates for the project.	Checked			
I have provided my summary budget based on UK government financial years i.e. 1 April – 31 March and in GBP in the application form.	Checked			
I have uploaded my project implementation timetable using the specific template provided.	Checked			
(If copying and pasting into Flexi-Grant) I have checked that all my responses have been successfully copied into the online application form.	Checked			
The application has been signed by a suitably authorised individual (clear electronic or scanned signatures are acceptable).	Checked			
I have checked the Darwin Plus website immediately prior to submission to ensure there are no late updates.	Checked			
I have read and understood the Privacy Notice on the Darwin Plus website.	Checked			

We would like to keep in touch!

Please check this box if you would be happy for the lead applicant (Flexi-Grant Account Holder) and project leader (if different) to be added to our mailing list. Through our mailing list we share updates on upcoming and current application rounds under Darwin Plus. We also provide occasional updates on other UK Government activities related to biodiversity conservation and share project news. You are free to unsubscribe at any time.

Unchecked

Data protection and use of personal data

Information supplied in the application form, including personal data, will be used by Defra as set out in the **Privacy Notice**, available from the <u>Forms and Guidance Portal</u>.

This **Privacy Notice must be provided to all individuals** whose personal data is supplied in the application form. Some information may be used when publicising Darwin Plus including project details (usually title, lead partner, project leader, location, and total grant value).

Project Title:

Darwin Plus Local

Provide a **Project Implementation Timetable** that shows the key milestones in project activities. Complete the following table as appropriate to describe the intended workplan for your project. Projects are based on UK Financial Years (**1 April – 31 March** - therefore starts April 2023).

Please add/remove columns to reflect the length of your project. For each activity (add/remove rows as appropriate) indicate the number of months it will last, and shade only the months in which an activity will be carried out. The workplan can span multiple pages if necessary.

		No. of	No. of UK Financial Year 2023/24											
Activity #	Description (max 25 words)	months	Calendar Year 2023 Calendar Year 20						2024					
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	Acquiring all components on-line	3												
2	Assembly and testing of the WSNs	7												
3	Organizing and executing a 3 weeks trip to attach WSNs to iguanas	3												
4	Data collection and processing	4												
5	Deliverables	3												